WHAT IS CLAIMED IS:

Sub A7

1. A method of processing information using a soft output Viterbi algorithm (SOVA), comprising the steps of:

iteratively for successive information symbol times, for each of a plurality of possible states of a trellis, each state being reachable via a plurality of possible transition paths in the trellis associated with respective symbol values:

determining a probability of reaching the state via each transition path, and a total probability of reaching the state; and

providing at least one vector of probabilities for respective symbol values for reaching the state by summing, for each element of the vector, products of the probability of reaching the state via the respective paths with respective elements of vectors provided for previous states from which the state can be reached via the respective paths;

and

providing a probability for each information symbol from respective elements of said at least one vector for all of the possible states of the trellis for a respective symbol time.

2. A method as claimed in claim 1 wherein the symbol values represent binary values and said at least one vector of probabilities for respective symbol values comprises a vector of probability ratios for said binary values.

3. A method as claimed in claim 1 wherein the symbol values have a plurality of q values and said at least one vector of probabilities for respective symbol values comprises at least q-1 vectors of probability ratios for said q values.

4. A method as claimed in claim 1 wherein the symbol values have a plurality of q values and said at least one vector of probabilities for respective symbol values comprises q vectors of probabilities.

5. A method as claimed in claim 1 wherein said at least one vector of probabilities provides logarithmic probabilities.

6. A method as claimed in claim 1 wherein the symbol values represent binary values and said at least one vector of probabilities for respective symbol values comprises a vector of logarithmic probability ratios for said binary values.

7. A method as claimed in claim 1 wherein the symbol values represent binary values and said at least one vector of probabilities for respective symbol values comprises two vectors of probabilities, one for each of the binary values.

8. A method of decoding q-ary encoded information symbols where q is a plural integer, comprising the steps of:

providing, for each possible state of a decoding trellis at an information symbol time, q probability vectors for reaching the state via a path of δ information symbols of the trellis, and a total probability of reaching the state, and updating the vectors and total probability for each state at a next information symbol time by the steps of:

determining a probability for each of q possible transition paths from a state at said one information symbol time to the state at said next information symbol time;

determining the total probability of reaching the state at said next information symbol time from the probabilities of the q possible transition paths to said state at said next information symbol time; and

for each of q possible information symbol values at each state at said next information symbol time, merging respective probability vectors for states at said one information symbol time in accordance with the respective probabilities of the transition paths from such states at said one information symbol time to the state at said next information symbol time;

and

determining a probability for an information symbol δ information symbols before said next information symbol time from respective elements of said probability vectors for all of the possible states at a respective information symbol time.

9. A method as claimed in claim 8 wherein each probability vector provides logarithmic probabilities.

10. A method as claimed in claim 8 wherein the q probability vectors for each state are represented by q-1 vectors of probability ratios.

11. A method as claimed in claim 10 wherein each vector provides logarithmic probability ratios.

12. A method as claimed in claim 10 wherein q = 2.

13. A method as claimed in claim 8 wherein q = 2.

14. A method as claimed in claim 8 and further including the step of, for each information symbol time, normalizing the total probabilities for all of the states.

15. A method of decoding encoded binary information symbols comprising the steps of:

updating for successive symbol times a vector of logarithmic probability ratios for each state of a decoding trellis at a respective symbol time, each vector corresponding to a survivor path through the decoding trellis, each logarithmic probability ratio representing in a logarithmic domain a ratio of the relative probabilities of the symbol representing a binary one or a binary zero, the updating comprising:

determining probabilities for reaching each state via respective transition paths corresponding to binary one and zero values of the information symbols from respective states at a previous symbol time;

combining said probabilities to determine total probability of reaching the state; and

for binary one and zero information symbol values at each state, merging respective probability vectors for the respective states at said previous information symbol time in accordance with the respective probabilities of the transition paths from such states;

and

determining a probability ratio for an information symbol at the start of the survivor path from elements of the vectors for all of the possible states of the decoding trellis at a respective information symbol time.

16. A method as claimed in claim 15 and further including the step of, for each information symbol time, normalizing the total probabilities for all of the states.

17. A decoder arranged to carry out the method of claim 15.

18. A method of decoding encoded binary information symbols comprising the steps of:

updating for successive symbol times two vectors of logarithmic probabilities for each state of a decoding trellis at a respective symbol time, each vector corresponding to a survivor path through the decoding trellis, each logarithmic probability of the two vectors representing in a logarithmic domain a probability of the symbol representing a binary one or a binary zero respectively, the updating comprising:

determining probabilities for reaching each state via respective transition paths corresponding to binary one and zero values of the information symbols from respective states at a previous symbol time;

combining said probabilities to determine total probability of reaching the state; and

for binary one and zero information symbol values at each state, merging respective probability vectors for the respective states at said previous information symbol time in accordance with the respective probabilities of the transition paths from such states;

and

determining a probability ratio for an information symbol at the start of the survivor path from elements of the vectors for all of the possible states of the decoding trellis at a respective information symbol time.

19. A method as claimed in claim 18 and further including the step of, for each information symbol time, normalizing the total probabilities for all of the states.

20. A decoder arranged to carry out the method of claim 18.